

HPC4Mfg Program Collaborations for U.S. Manufacturers

The High Performance Computing for Manufacturing (“HPC4Mfg”) Program seeks qualified industry partners to participate in short-term, collaborative projects. Through support from the Advanced Manufacturing Office of the Department of Energy’s (DOE) Office of Energy Efficiency and Renewable Energy (EERE), selected projects partners will be granted access to High Performance Computing (HPC) facilities and experienced staff at DOE National Laboratories. The collaborations will address key challenges in U.S. manufacturing by apply modeling, simulation, and data analysis to the manufacturing of materials with the intent to improve energy efficiency, increase productivity, reduce cycle time, enable next-generation technologies, test control system algorithms, investigate intensified processes, lower energy cost, and accelerate innovation. Projects must demonstrate potential impact to energy efficiency in manufacturing and/or the development of new clean energy technologies with a potential for broad national impact. Eligibility for this Program is limited to entities that manufacture products in the U.S. for commercial applications and the organizations that support them. Selected projects will be awarded up to \$300,000 to support compute cycles and work performed by the national lab partners. The industry partner must provide a participant contribution of at least 20% of the DOE funding for the project. The HPC4Mfg Program anticipates making multiple awards, subject to the availability of funding.

Background

DOE maintains world-class HPC expertise and facilities, currently hosting five of the top twelve most powerful computers in the world. From detailed atomic-level simulations to massive cosmological studies, researchers use HPC to probe science and technology questions inaccessible by other experimental methods. Scientific insights gained from these computational studies have drastically impacted research and technology across industrial sectors and scientific fields. Examples include additive manufacturing, oil recovery, drug development, climate science, genomics, and exploration of fundamental particles that make up our universe. From industry to academia, the scientific need for compute power pushes the limits of current computers and continues to drive innovation and development for future high performance computers and their capabilities.

There is high potential for the U.S. manufacturing industry to utilize the power of HPC. The HPC4Mfg Program is intended to provide HPC expertise and resources to manufacturing industries to lower the risk of HPC adoption and broaden its use to support advanced clean energy manufacturing. The DOE Advanced Manufacturing Office (AMO) within EERE sponsors this HPC4Mfg Program. AMO partners with private and public stakeholders to support the research, development and deployment of innovative technologies that can improve U.S. competitiveness, save energy, and ensure global leadership in advanced manufacturing and clean energy technologies. AMO supports cost-shared research, development, and demonstration activities in support of crosscutting next generation technologies and processes that hold high potential to significantly improve energy efficiency and reduce energy-related emissions, industrial waste, and the life-cycle energy consumption of manufactured products.

Program Objective

The objective of the HPC4Mfg Program is to enable targeted collaboration between the national laboratories and the U.S. manufacturing industry to investigate, improve, and scale methods that will accelerate the development and deployment of innovative energy efficient manufacturing or enable the production or adoption of clean energy technologies. This solicitation is aimed at demonstrating the benefit of HPC toward these goals within one year.

Improved energy efficiency across the manufacturing industry is one of the primary goals of the HPC4Mfg Program. We solicit proposals that improve understanding and optimize manufacturing processes.

Applied research, development and ultimate adoption of clean energy technologies is the other primary goal of the HPC4Mfg program. We solicit proposals that demonstrate the use of HPC to help develop new, innovative clean energy technologies, optimize device design, predict device performance, shorten time to market, and reduce the number of testing cycles in product development.

Successful applicants will work collaboratively with staff from one or more of the DOE laboratories to conduct project activities across the various HPC areas of expertise, including development and optimization of modeling and simulation codes, porting and scaling of applications, application of data analytics, as well as applied research and development of tools or methods.

To make the broadest impact across the industry, the project teams will present their results at the annual HPC4Mfg Industry Day. Publications in appropriate trade journals are also encouraged.

The DOE national laboratory system provides the HPC expertise and capabilities for the HPC4Mfg Program. Lawrence Livermore National Laboratory (LLNL) administers the program, with Lawrence Berkeley National Laboratory (LBNL) and Oak Ridge National Laboratory (ORNL) as managing partners. Additional labs will be added as the program grows.

Eligibility

Eligibility is limited to U.S. manufacturers, defined as entities that are incorporated (or otherwise formed) under the laws of a particular State or territory of the United States, and which manufactures products in the United States. U.S. universities, institutes, and other non-profit organizations are also eligible to participate, although an explanation of potential impact on manufacturing should be identified for non-manufacturing applicants.

Funding Requirements

The DOE monetary contribution for each project will not exceed \$300,000. An industry partner must provide a participant contribution of at least 20% of the DOE funding for the project to support industry expertise to the project. The participant contribution can take the form of monetary funds-in or “in-kind” contributions and must come from non-federal sources unless otherwise allowed by law. The DOE funding will be provided to the national laboratory (or laboratories) in support of their work under the HPC4Mfg Program. On a limited basis, U.S.

universities may also be supported via a subcontract from a national laboratory partner.

A special Cost Share Waiver is available for Domestic Institutions of Higher Education, Domestic Nonprofit Entities, or U.S. State, Local, or Tribal Government Entities, which may reduce the 20% participant contribution. The Assistant Secretary for the Office of Energy Efficiency and Renewable Energy has issued a Cost Share Reduction determination pursuant to Section 988(b)(3) of the Energy Policy Act of 2005 that is applicable to certain entities applying under this call.

Note: THIS IS NOT A PROCUREMENT REQUEST.

Concept Paper Guidelines

Interested parties will first submit a concept paper by the due date provided below that describes the objectives of the project. The concept paper will be evaluated against the documented criteria. Successful concept papers will be invited to submit a full proposal.

The concept paper template can be downloaded from the web site and should be used to prepare your submission. The concept paper should not exceed two (2) single-spaced pages using 12-point font (Times New Roman preferred), should be in PDF file format and should address the instructions in each section. A concept paper that does not meet the Guidelines may be rejected.

- **Title Page:** *(not included in page limit)* Project title; company name, description and US manufacturing location(s); company principal investigator(s) (PI) contact information. Include national lab PI contact information, if known. Acknowledgement of the required 20% cost-share, and indication of business sector and process category (list provided).
- **Abstract (150 words or less):** ***Non-proprietary**, summary of problem being addressed, why problem is important to the energy future of the US, plan to address problem, and the impact the solution will have on national energy.*
- **Background:** *Explain the technical challenge to be addressed, the state-of-the-art in this area and how this work advances the state of the art, how solving this problem will meet the goals of the HPC4Mfg program, the relevant expertise of the industry partners, what national lab expertise is needed, why national laboratory HPC resources are required and how they will be used.*
- **Project plan and objectives:** *Describe the technical scope of work to be performed and how this scope will fit into the broader solution for the challenges being addressed. Describe how the results of the project will be validated, including availability of data. If possible, describe specific simulation codes to be used in this effort.*
- **Impact:** *Describe how this effort will result in long-term energy savings across the industry, the production or deployment of clean energy technologies with broad commercial application, and/or the ability of an industry to accelerate the development and deployment of innovative energy efficient manufacturing. Metrics include cost savings, energy savings and/or improvements in energy intensity.*

Completed concept papers, derived from the provided template, must be submitted in PDF file format by email to hpc4mfg-submissions@llnl.gov by 11:59pm PST on the deadline indicated below. The subject line should include: HPC4Mfg Concept Submission. Receipt of concept papers will be confirmed within one week of submission. Concept papers will be evaluated against the criteria described below.

Full Proposal Guidelines

Successful concept paper submissions will be notified and paired with a Principle Investigator (PI) from LLNL, LBNL, ORNL, or a combination of these national laboratories, to collaborate on development of a full proposal. Full proposals will be evaluated against the criteria described below.

The proposal template can be downloaded from the web site and should be used to prepare your submission. Proposals should not exceed six (6) single-spaced pages using 12-point font (Times New Roman preferred), should be in PDF file format, and should address the instructions in each section. Proposals that do not meet the guidelines may be rejected.

- **Title Page:** *(not included in page limit)* Project title; company name, description and US manufacturing location(s); company principal investigator(s) (PI) contact information. Include national lab PI contact information, if known. Acknowledge the need to provide 20% cost-share and the agreement to enter into the DOE Short Form CRADA.
- **Abstract (150 words or less):** ***Non-proprietary, publishable** summary of problem being addressed, why problem is important to the energy future of the US, plan to address problem, and the impact the solution will have on the national energy. If selected for the HPC4Mfg Program, this abstract will appear on award announcements.*
- **Background:** *Explain the technical challenge to be addressed, the state-of-the-art in this area and how this work advances the state of the art, how solving this problem will meet the goals of the HPC4Mfg program, the relevant expertise of the industry partners, what national lab expertise is needed, why national laboratory HPC resources are required and how they will be used. Indicate if the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty.*
- **Project plan and objectives:** *Describe the technical scope of work to be performed and how this scope will fit into the broader solution for the challenges being addressed. Describe a set of tasks to be performed and define what work industry partners will perform and what work laboratory partners will perform. Describe how the results of the project will be validated, including availability of data. If possible, describe specific simulation codes to be used in this effort.*
- **Tasks, Milestones, Deliverables, Schedules:** *Goals, timelines and due dates throughout life of project. Not every milestone needs to have a deliverable. Include deliverables from national lab and industry partner(s). Indicate responsible party(ies) for each deliverable. Include deliverables from one partner to another as well as those to AMO.*
- **Impact:** *Estimate how this effort will result in long-term energy savings across the industry,*

the production or deployment of clean energy technologies with broad commercial application, and/or the ability of an industry to accelerate the development and deployment of innovative energy efficient manufacturing. Describe how this work contributes to a transformational change in the energy sector and the enduring economic impact. Metrics include cost savings, energy savings and/or improvements in energy intensity.

- **Implementation:** *Describe how this work will be incorporated into company and industry-wide operations. Describe the follow-on activities to extend this effort to solve the broader problem being addressed.*
- **Appendix A - Project Budget (not included in page count):** *Summarize project costs including amount and source of participant contribution in the table provided on the proposal template. Indicate in kind and/or cash contribution for industry funding. Include a description of how this funding will make a large difference relative to existing funding from other sources, including the private sector and why the government should fund this work.*
- **Appendix B - Computational Resources (not included in page count):** *Describe the computational approach, the performance of the codes, and the resources requested (platform and number of core hours). Also describe how the results are to be disseminated to the end users.*
- **Appendix C - Qualifications and Experience: (not included in page limit):** *Include resumes of key participants.*

Completed proposals, derived from the provided template, must be submitted in PDF file format by email to hpc4mfg-submissions@llnl.gov by 11:59pm PST on the deadline indicated below. The subject line should include: HPC4Mfg Proposal Submission. Receipt of proposals will be confirmed within one week of submission.

Proposal evaluation will be conducted by a Technical Merit Review Committee consisting of experts in the application of HPC modeling, simulation, and data analysis from each of the participating DOE national laboratories, and members of the DOE AMO with knowledge of the US Manufacturing industry. Subject Matter Experts will be consulted to verify claims, including description of current state of the art and estimate of project impact (e.g. cost and energy savings).

The portfolio of proposals recommended by the committee will be submitted to AMO senior managers for final funding approval, subject to the availability of funding. All AMO funding decisions shall be final. Upon approval from AMO, the HPC4Mfg Program Director will issue a response to each applicant and successful applicants will begin CRADA initiation. Once both parties approve the CRADA, the projects can begin execution. Failure to engage promptly in CRADA negotiations can result in the rejection of the project. The portfolio of projects will be posted on <http://hpc4mfg.llnl.gov/>. The HPC4MfgProgram reserves the right to select all, a portion, or none of the submissions.

Evaluation Criteria

- Degree to which the proposed effort advances the current “State of the Art”
- Appropriateness for national laboratories
- Technical feasibility

- Industry participant contribution and participation
- Impact, including Lifecycle Energy Impact, broad industrial impact through new clean energy technology development and/or energy efficient manufacturing technologies, as well as impact on employment and manufacturing in the United States
- Strength and balance of the technical team, including modeling expertise on both the national laboratory and industry sides and process experts for the model validation

Timeline

Estimates will be replaced by firm dates as the solicitation progresses.

Event	Date (2016)
Call for Proposal	March 17
Concept Paper due	April 21
Request for full proposal	Early June
Full proposal due	Mid July
Finalists notified	August
Expected project start	October

Point of Contact

During the period of the call for proposals, all questions relating to this announcement should be directed to the HPC4Mfg Director at hpc4mfg-submissions@llnl.gov. Answers will be posted on <http://hpc4mfg.llnl.gov/>. Industrial partners that are interested in submitting applications should refrain from contacting members of the HPC4Mfg Program during the call for proposals.

Intellectual Property and Proprietary Data

The HPC4Mfg Program respects the importance of intellectual property and data security.

Industry awardees are expected to enter into a DOE Model Short Form CRADA with the national laboratory or laboratories that will be performing the work. This CRADA contains provisions relating to proprietary information and intellectual property. Because of the need for accelerated placement and execution of the projects, terms of the CRADA will not be subject to negotiation. To review the proposed terms that make up the DOE Model Short Form CRADA, please see the attached.

For academic awardees IP and Proprietary Data terms, as needed, will be defined in the subcontracts issued to the U.S. University.

Significant delays by the industry or academic partner to finalize the CRADA or sub-contract could result in rejection of the proposal.

A Non-Disclosure Agreement can be put into place during development and submission of the proposal to facilitate discussions while protecting the partner's proprietary information. To the extent possible, it is preferred that proprietary information NOT be included in the submitted proposal. If company proprietary information is included in the proposal, the specific information should be marked as such, and HPC4Mfg Program officials will utilize reasonable efforts to treat the information as business sensitive.